great deal of drilling has been going forward, and the productive districts remain as at the end of 1887, four in number; viz., the Berea grit, the Ohio shale, the Clinton limestone, and the Trenton limestone. The last-named stratum, which is both a gas and oil bearing rock in northern Ohio and central Indiana, is, excepting possibly the Bradford sand, the most important single source of petroleum and gas on this continent. The oil is still ranked as inferior, on account of the present difficulty of refining it; but there is no drawback to the gas, as is apparent from the following analyses, made for the United States Geological Survey: —

	Findlay.	Fostoria.	St. Mary's.
Hydrogen	1.64	1.89	1.74
Marsh-gas	93.35	92.84	93.85
Olefiant gas	.35	.20	.20
Carbonic oxide	.41	.55	.44
Carbonic acid	.25	.20	.23
Oxygen	.39	.35	.35
Nitrogen	3.41	3.82	2.98
Sulphuretted hydrogen	.20	.15	.21
Total	100.00	100.00	100.00

The small fraction, one-fifth of one per cent, of sulphuretted hydrogen is held to be decidedly advantageous, as it affords a certain means of detecting leaks.

No place within the natural-gas belt has derived greater advantages from this fuel-supply than Findlay, where in November, 1884, it was first found that the Trenton limestone, at some places at least, contained stores of high-pressure gas. Since January, 1886, the population of the town has increased from 6,000 to 30,000. Although there are rolling-mills, chain-works, machine and edge-tool shops, etc., the principal industry is glass, 155 pots being used by the ten firms engaged in making window-glass, fine flint ware, and bottles.

This growth has been built up in Findlay, as in other towns, by giving free, or nearly free, gas to manufacturers, — a gift which in some instances has been supplemented by land and contributions to capital, either from the town or parties interested in real estate. Under these circumstances, the question of the continuance of the supply is a vital one. Professor Orton has contended that the supply is a stored one, and notwithstanding the reasonableness of the theory, in view of the exhaustion of all deposits of liquid hydrocarbons, the gas has been used most profusely for the rough work of founderies, rolling-mills, brick and tile works, lime-burning, and the like, until, a short time since, Findlay found itself short of gas. A new well was drilled in, and, on being shot, responded with a pressure in the open casing of from 38 to 40 pounds, equivalent to a yield of about 30,000,000 cubic feet per day. The famous Karg well, which has been the main reliance of the town for the past two years, was estimated to discharge 12,000,000 cubic feet.

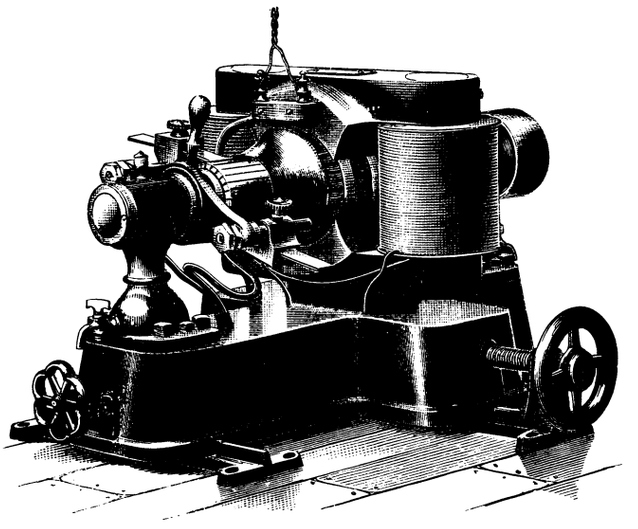
This shortage of gas has led to an investigation, from which the professor concludes that none of the large wells in the field have flowed three years, practically unrestrained, without giving unmistakable signs of nearing their limit. In some cases oil invades them; in others, salt water. The smaller wells appear in some instances to have a longer lease of life than the great wells. In some of the town wells the original rock pressure has been reduced by about three-eighths, but in others it is claimed it is fully maintained, only more time is required for gathering. The area exhausted by a vigorous well is not yet determined, but it is thought that the central portion of Findlay is partially drained of its original supply. As the city has pledged itself to furnish many million feet of gas each day, great energy and sagacity will be required to maintain in full vigor the splendid industries now established, and insure the continued prosperity of the town.

What is predicted of the Ohio Trenton limestone gas-field may probably be asserted as to the 2,000 square miles of the field in Indiana, though, if wells yielding 30,000,000 cubic feet of gas per day, equivalent to nearly 1,000 tons of coal, are to be found whenever a shortage occurs, there may be a longer lease of the industrial life of that region than a cursory reading of Professor Orton's article might lead one to infer.

THE DENISON MOTOR AND DYNAMO.

THE accompanying illustration shows the form of dynamo and motor now manufactured by Mr. J. F. Denison of New Haven, Conn. These machines do not differ in their construction much from that which experience has shown to be desirable, but the motors have some points worthy of special consideration.

An arrangement known as the Denison interlocking starting attachment is contained in the base of the machine, and is said to prevent any mistake in operating the motors. This attachment is



THE DENISON MOTOR AND DYNAMO.

so arranged that the current cannot be thrown on unless the resistance in the rheostat in the base is in the proper position. This is manipulated by a hand-wheel. In case of accidental breaking of the circuit, an automatic lock makes it impossible to turn the current on until the resistance is again in normal condition. The absence of attachments external to the machine, which are usually placed on the wall, the machine being entirely self-contained, does away with the expense of sending out special attendants to set it up. Further, as there are but two binding-posts, it is impossible to make a mistake in wiring.

HEALTH MATTERS.

Analysis of Foods.

THE commissioner of internal revenue of the United States has published the regulations concerning the analysis of foods and drugs in the District of Columbia. These regulations are based on the Act of Congress passed in 1888, entitled "An Act to prevent the Manufacture or Sale of Adulterated Food or Drugs in the District of Columbia." Section 12 of this Act provides that any health-officer, inspector of nuisances, or any food-inspector, may procure any sample of food or drug, and, if he suspects the same to have been sold to him contrary to any provision of the Act, he shall submit it to the commissioner of internal revenue to be analyzed. An offence shall be deemed to be committed in the case of drugs, if it differs from the standard of strength, quality, or purity laid down in the pharmacopœia, or falls below the professed standard under which it is sold. In the case of foods, the regulation gives a standard for butter, cheese, cocoa, chocolate, coffee, honey, lard, malt liquors, milk, mustard, olive-oil, oysters, pepper, tea, vinegar, wheaten flour, bread, and wine.

A large number of coloring-matters are prohibited for use in foods. Among these are aniline, gamboge, fuchsine, naphthol yel-

low, and others. Salicylic acid and its salts are prohibited, as are also boracic acid and borax, glycerine, and alum. A list of harmless coloring-matters is given. The pamphlet also contains a list of periodicals, official reports, and general and monograph volumes of the greatest importance in connection with the detection of adulteration of food and drugs. This bibliography is exceedingly valuable, and, we should judge, very complete.

THE SURGEON-GENERAL AND THE NATIONAL BOARD OF HEALTH. — The "Annual Report of the Supervising Surgeon-General of the Marine Hospital Service of the United States for the Fiscal Year 1888," has just been published. It contains the customary statistics of this branch of the national service, and, in addition, a considerable amount of interesting matter in reference to the recent epidemic of yellow-fever in Florida, with photographic illustrations of the camps of refuge, and a map of Jacksonville showing the streets and sewers. It is much to be regretted that the supervising surgeon-general should, in an official report, have attacked the National Board of Health, and the excellent work which it did during the days when it had the power and the means. He charges Dr. Bowditch of Boston with "special pleading for a pet object," when, in September last, he expressed in a public letter the wish that a new birth might be granted to the national board with greater powers. The supervising surgeon-general speaks of this letter as being "ingeniously constructed," and further says that unfortunately the facts do not bear out the statements therein contained. If men of the standing and reputation of Dr. Bowditch can be thus attacked in governmental reports, we shall wish that some censorship may be established to which these reports shall be submitted before they are permitted to go forth with the official sanction.

TEMPERANCE INSTRUCTION IN PUBLIC SCHOOLS. — The report of the Department of Scientific Temperance Instruction in Public Schools for the year 1888 shows that twelve million children in this country are now under compulsory temperance education laws; that is to say, that the law has provided the education in favor of total abstinence that results from learning the nature and effects of alcoholic drinks and narcotics. This report further shows that there is no New England State without such a law; New Jersey is the only Middle State that has not enacted such a law; ten Southern and two Western States are still unprovided in that regard. The Act of Congress of 1886 brought all the Territories under the law. Those interested in this subject will find reports from the different sections of the country of the work done, and the difficulties to be met and overcome in States in which as yet compulsory laws have not been enacted.

DIPHTHERIA AND SANITATION. — If the reports which the newspapers publish in reference to the sanitary condition of Gallitzin, Penn., are true, it is not a matter of surprise that diphtheria, once introduced, should prevail in epidemic form. In a population of only two thousand people, one hundred deaths from this disease are said to have occurred since November. The disease is attributed to the disregard of the common rules of sanitation. The town has no water-supply. The outhouses and wells stand close together, and, since the McCoy mines have been opened, over half the wells in the town have gone dry. The inhabitants have used water from the few remaining wells that have become impure. Fortunately there is an excellent State board of health in Pennsylvania, which will at once take the matter in hand.

ETHNOLOGY.

The Blackfoot Sun-Dance.

MUCH has been said regarding the barbarous dances of the Blackfeet and their neighbors, but the majority of reports have been made on hearsay. Therefore an authentic description of the ceremonies by an eye-witness, who is, moreover, thoroughly conversant with the native language, must be highly welcome to students of primitive man. The Rev. Dr. John McLean has presented such a description to the Canadian Institute of Toronto. It is one of the important results of the establishment by the British Association, of a committee for the study of the Indians of the Canadian North-west, that missionaries begin to improve their opportunities of observing native customs, and of making available their studies of native languages.

The sun-dance is celebrated every summer. Last summer, when Dr. McLean visited the Blood Indian camp, he found the sun-lodge erected. There were by actual count one hundred and ninety-eight lodges, comprising about two thousand souls. An old man was riding through the camp, calling upon the people to attend the ceremonies. In a lodge near at hand, a medicine-man was decorating the persons who were to undergo the rite of torture. In arranging their head-dress, before putting it on, he passed his hand around it four times, praying. In the sun-lodge the sacred fire was burning, and this was used by the people for lighting their pipes. No child or woman was allowed to supply the fuel; but young men who had performed some valorous deed, especially the stealing of horses from a hostile tribe, felt it to be an honor to attend to this duty; and none but the brave are qualified for this work. On the sacred pole were placed, in the form of a cross, two bundles of small brushwood taken from the birch-tree. The pole was decorated with sacrifices to the sun of clothing and various kinds of Indian goods. The cross evidently refers to the four winds, from its four points, as does the number 4, which is regarded as the sacred number. In the bower made of light brushwood sat a woman who gave the festival that year, her husband, and a medicine-man. These persons were fasting and praying; and, during the full term of the continuance of the ceremonies, very little food was partaken of. In the mornings they were allowed a short smoke and a little water; and in the evenings a few of their friends brought a small quantity of food hidden under their blankets, and, without exposing it to view, it was eaten in silence. The medicine-man had a crown of leaves upon his head. His body was painted, and without any clothing, save a long strip around his loins. At short intervals he arose and danced, keeping time to the motions of his body with a small bone whistle, which he blew upon incessantly, producing a series of monotonous sounds. In the evening the woman prayed to the sun for good health for the people, protection in danger, good crops, and a bountiful harvest of wild fruits. The virgins came in the evening, and prayed for a long time for blessings from the sun. During the day the ceremonies consisted of dramatic representations of heroic adventures by single individuals, and contests with the Crow and Sioux Indians by war-parties. One chief borrowed several guns from his friends, and a large number of Indian war-implements and native trinkets. Stepping forward that all the people might see him, amid profound silence, he addressed the assemblage. Holding a gun aloft, he told how, in a contest with an enemy, he had slain him and taken his gun. The band of musicians beat on their tomtoms in token of applause. Each article that he had represented his various victories, and each had its separate story, which was narrated at first, and the same routine gone through. When he had finished, the whole assemblage joined the musicians in applauding the speaker. Many warriors during the day related their brave deeds in the same manner.

Sham-fights were engaged in, which were representations of actual battles. Five or six warriors appeared as Crow Indians, and the same or a less number were the Blood Indian warriors. A single horse represented that they had been on horseback, and this was decked in its war-paint. One of the men, the hero of the battle, acted as instructor of the ceremonies to the others. Four times they entered the lodge, and then the fight began. They fired their guns over the heads of the people; the Crow Indians fell one by one; and when they had been scalped, amid the laughter and applause of the audience, the scene was at an end. Berries cooked in fat were brought in by the women in pails and pots; and for a short time eating, smoking, and conversation were the duties of the hour. Occasionally some old lady would call out the name of a young man, and declare his noble qualities before the people; and another would urge the young men to emulate the heroic deeds of their fathers, and go to war.

Presents of bracelets, finger-rings, and ear-rings were made to some of the women. The chief warrior carried in his hand the sacred pipe, which he first held aloft with the stem toward the sun, that he might have the first-fruits of every thing; and still holding it,